AMENDED CLAIMS

1 - 23. (Canceled)

24. (Currently Amended) A method for assessing physiological function in an individual, comprising:

(a) placing a sensor superficially on an individual, said sensor comprising a stimulator, a detector, and a flexible connector formed integral with and serving as a mechanical and electrical connection between said stimulator and said detector:

said stimulator being shaped to fit a first anatomical site and configured to generate a stimulus and apply said stimulus to stimulate a nerve at said first anatomical site;

said detector being shaped to fit a second anatomical site, said detector comprising a plurality of electrodes each configured to detect a response signal generated at said second anatomical site in response to said stimulus, said detector being made so that said electrodes have fixed positions proximate one another; and

said connector being configured to mechanically orient said stimulator and said detector relative to one another and automatically position said detector substantially adjacent to said second anatomical site when said stimulator is placed substantially adjacent to said first anatomical site on the surface of an individual, whereby said electrodes are located at proximate points along said surface; and

(b) performing nerve conduction studies with at least one of said electrodes to assess physiological function in an individual;

wherein said nerve conduction studies comprises:

(c) operating said stimulator to stimulate said first anatomical site and monitoring said plurality of electrodes to detect response signals produced at said second anatomical site in response to the stimulation at said first anatomical site;

(~~c~~d) processing the response signals detected by said electrodes, said processing involving an evaluation of selected parameters of each of said response signals and a comparison of said response signals according to the evaluated selected parameters;

(~~d~~e) ~~determining from~~ selecting on the basis of said comparison of said response signals processed in step (~~c~~d)at least one electrode detecting a response signal characteristic of said second anatomical site; and

(~~e~~f) performing said nerve conduction studies according to step (c) ~~of step (b)~~ with said at least one electrode selected in step (~~d~~e).

25. (Currently Amended) The method of claim 24 wherein in step (f) said nerve conduction studies comprise measurement of an F-wave latency.

26. (Currently Amended) The method of claim 24 wherein in step (f) said nerve conduction studies comprise measurement of a motor latency.

27. (Currently Amended) The method of claim 24 wherein in step (f) said nerve conduction studies comprise measurement of a sensory latency.

28.(Currently Amended) The method of claim 24 wherein in step (f) said nerve conduction studies comprise measurement of a sensory amplitude.

29. (Currently Amended) The method of claim 24 wherein in step (d) said processing comprises amplitude comparison between a plurality of response signals generated at said second anatomical site.

30. (Currently Amended) The method of claim 24 wherein in step (d) said processing comprises frequency spectrum comparison between a plurality of response signals generated at said second anatomical site.

31. (Previously Presented) The method of claim 24 wherein at least one response signal generated at said second anatomical site comprises peripheral evoked potentials.

32.(Currently Amended) The method of claim 29 wherein in step (d) said amplitude comparison comprises maximal peak to peak amplitude.

33. (Previously Presented) The method of claim 30 wherein said frequency spectrum comparison comprises discrete Fourier transform analysis of said plurality of response signals generated at said second anatomical site and comparison of the spectral components of said plurality of response signals.

34. (Currently Amended) The method of claim 33 wherein ~~selected electrodes comprise electrodes with~~ in step (d) said at least one electrode detects response signals that have more energy at low frequencies.

35. (Currently Amended) The method of claim 24 wherein the nerve conduction studies of step (f) involve detecting at least one signal generated at said second anatomical site ~~comprises~~ comprising compound muscle action potential.

36. (Currently Amended) The method of claim 24 wherein said at least one electrode selected in step (d) is located over a muscle motor point at ~~one signal generated at~~ said second anatomical site ~~is recorded over a motor point~~.

37-47. (Canceled)

48. (Currently Amended) A method for assessing physiological function in an individual, comprising:

(a) providing a sensor for superficial application to an individual, said sensor comprising:

a stimulator for generating a nerve stimulus, said stimulator being shaped to fit a first anatomical site whereby application of said stimulus stimulates a nerve at said first anatomical site; and

a detector shaped to fit a second anatomical site, said detector comprising a plurality of electrodes each capable of detecting a signal generated at said second anatomical site in response to said stimulus applied at said first anatomical site, with said electrodes being fixed in spaced relation with one another, and

a flexible connector connecting said stimulator to said detector to form an integral unitary structure;

said flexible connector being constructed and shaped to effect mechanical localization of said detector relative to said stimulator whereby said detector will be automatically ~~position~~ positioned ~~said detector~~ substantially adjacent to said second anatomical site when said stimulator is placed substantially adjacent said first anatomical site on the surface of an individual;

(b) placing said sensor superficially on an individual so that said stimulator is located at and fits said first anatomical site and said detector is located at and fits said second anatomical site; and

(c) performing nerve conduction studies with said sensor to assess physiological function in an individual, said studies comprising (1) causing said stimulator to generate a stimulus on said individual at said first anatomical site, (2) causing said electrodes of said detector to detect response signals generated at said second anatomical site in response to said stimulus applied at said first anatomical site, and (3) ~~evaluating~~ recovering said response signals;

(d) processing the recovered response signals generated at said second anatomical site and detected by said electrodes to effect selection of ~~select~~ at least one electrode detecting a response signal characteristic of said second anatomical site, said selection involving evaluating two or more selected parameters of said response signals and comparing said response signals according to said evaluated selected parameters; and

(e) performing ~~the~~ additional nerve conduction studies as specified in step (c) with the at least one electrode selected in step (d).

49. (Currently Amended) The method of claim 48 wherein in step (d) said processing ~~further~~ comprises amplitude comparison between a plurality of response signals generated at said second anatomical site.

50. (Previously Presented) The method of claim 49 wherein said amplitude comparison comprises maximal peak to peak amplitude.

51. (Currently Amended) The method of claim 48 wherein in step (d) said processing comprises frequency spectrum comparison between a plurality of response signals generated at said second anatomical site.

52. (Previously Presented) The method of claim 51 wherein said frequency spectrum comparison comprises discrete Fourier transform analysis of said plurality of response signals generated at said second anatomical site and comparison of the spectral components of said response signals.

53. (Currently Amended) The method of claim 52 wherein ~~said at least one selected electrode comprises electrodes with more energy at low frequencies~~ the at least one

electrode selected in step (d) is selected because the response signals detected by said at least one electrode has more energy at low frequencies.

54. (Previously Presented) The method of claim 48 wherein each of said response signals generated at said second anatomical site comprises peripheral evoked potentials.

55. – 62. (Canceled)

63. (Currently Amended) Apparatus for assessing physiological function in an individual, the apparatus comprising:

a sensor comprising: a stimulator, a detector, and a flexible connector formed integral with and serving as a mechanical and electrical connection between said stimulator and said detector;

said stimulator being shaped to fit a first anatomical site and configured to generate a stimulus and apply said stimulus to stimulate a nerve at said first anatomical site;

said detector being shaped to fit a second anatomical site, said detector comprising a plurality of electrodes each configured to detect a response signal generated at said second anatomical site in response to said stimulus with the positions of said electrodes being fixed in relation to one another; and

said connector being configured to mechanically orient said detector relative to said stimulator and to automatically position said detector substantially adjacent to said second anatomical site when said stimulator is placed substantially adjacent to said first anatomical site on the surface of an individual, whereby said electrodes are positioned at different points along said second anatomical site;

wherein the apparatus is configured to select, from the plurality of response signals detected at by the plurality of detector electrodes, at least one electrode

detecting a response signal characteristic of said second anatomical site, with the selection of said at least one electrode being determined by an algorithm involving evaluation of several parameters of signals detected by said electrodes.

64. (Currently Amended) Apparatus of claim 63 wherein said ~~selecting~~ selection of said at least one electrode comprises amplitude comparison between a plurality of response signals generated at said second anatomical site.

65. (Currently Amended) Apparatus of claim 63 wherein said ~~selecting~~ selection of said at least one electrode comprises frequency spectrum comparison between a plurality of response signals generated at said second anatomical site.

66. (Previously Presented) Apparatus of claim 64 wherein said amplitude comparison comprises maximal peak to peak amplitude.

67. (Previously Presented) Apparatus of claim 65 wherein said frequency spectrum comparison comprises discrete Fourier transform analysis of said plurality of response signals generated at said second anatomical site and comparison of the spectral components of said plurality of response signals.

68. (Currently Amended) Apparatus of claim ~~67~~ 63 wherein ~~selected electrodes comprise electrodes with more energy at low frequencies~~ the selection of said at least one electrode involves a comparison of the power spectrum densities of detected response signals.

69. (Currently Amended) Apparatus for assessing physiological function in an individual, comprising:

a sensor comprising:

a stimulator for generating a nerve stimulus, said stimulator being shaped to fit a first anatomical site whereby application of said stimulus stimulates a nerve at said first anatomical site; and

a detector shaped to fit a second anatomical site, said detector comprising a plurality of electrodes each capable of detecting a signal generated at said second anatomical site in response to said stimulus applied at said first anatomical site, said electrodes being in fixed spatial relation to one another; and

a flexible connector connecting said stimulator to said detector to form an integral structure;

said flexible connector being constructed to mechanically orient said stimulator and detector relative to one another and being shaped to automatically position said detector so that said electrodes are substantially adjacent to said second anatomical site when said stimulator is placed substantially adjacent said first anatomical site on the surface of an individual;

wherein the apparatus is configured to determine, from a comparison of selected parameters of the response signals generated at said second anatomical site and detected by said electrodes, at least one electrode detecting ~~a~~an optimum response signal characteristic of said second anatomical site.

70. Currently Amended) Apparatus of claim 69 wherein said determining ~~further~~ comprises amplitude comparison between a plurality of response signals generated at said second anatomical site.

71. (Previously Presented) Apparatus of claim 70 wherein said amplitude comparison comprises maximal peak to peak amplitude.

72. (Previously Presented) Apparatus of claim 69 wherein said determining comprises frequency spectrum comparison between a plurality of response signals generated at said second anatomical site.

73. (Previously Presented) Apparatus of claim 72 wherein said frequency spectrum comparison comprises discrete Fourier transform analysis of said plurality of response signals generated at said second anatomical site and comparison of the spectral components of said response signals.

74. (Currently Amended) Apparatus of claim 73 wherein said at least one ~~selected~~ electrode comprises electrodes that detect signals with more energy at low frequencies.

75. (Canceled)

76. (New) The method of claim 24 wherein said first site is a location over a nerve and said second site is a location over a muscle innervated by said nerve or a location over different portion of said nerve.

77. (New) Apparatus according to claim 63 wherein said sensor comprises a continuous base layer that forms part of said stimulator, said detector and said connector.

78. (New) Apparatus according to claim 69 configured so that the selection of said at least one electrode is accomplished by comparing two or more parameters of each response signal detected by one of said electrodes with like parameters of the response signals detected by others of said electrodes.

79. (New) A method for assessing physiological function in an individual, comprising:

(a) providing a sensor comprising a stimulator, a detector, and a flexible connector formed integral with and serving as a mechanical and electrical connection between said stimulator and said detector:

said stimulator being shaped to fit a first anatomical site and configured to generate an electrical stimulus to stimulate a nerve at said first anatomical site;

said detector being shaped to fit a second anatomical site, said detector comprising a plurality of electrodes each configured to detect response signals evoked by a muscle at said second anatomical site in response to said stimulus, said electrodes being in fixed spatial relation to one another; and

said connector being constructed so as to determine the spatial position of said detector relative to said stimulator and being configured to automatically position said detector substantially adjacent to said second anatomical site when said stimulator is placed substantially adjacent to said first anatomical site on the surface of an individual; and

(b) placing said sensor on an individual so that said stimulator is positioned substantially adjacent to a first anatomical site characterized by a nerve to be studied and said detector is positioned adjacent to a second anatomical site characterized by a muscle associated with said nerve,

(c) operating said stimulator to stimulate said nerve at said first anatomical site;

(d) operating said detector so as to cause said electrodes to detect response signals evoked by said muscle at said second anatomical site in response to the stimulation of said nerve at said first anatomical site;

(e) processing the response signals detected by said electrodes to determine from parameters of said response signals the electrode or electrodes located closest to the motor point of said muscle; and

(f) with said sensor still in place on said individual, performing nerve conduction studies using the detector electrode(s) located closest to the motor point of said muscle.

80. (New) The method of claim 79 wherein said response signals are in the form of biopotentials detected on the skin of said individual overlying said second anatomical site.

81. (New) The method of claim 79 wherein step (e) involves determining the latency, peak-to-peak amplitude and slope of said response signals and determining therefrom the detector electrode(s) located closest to the muscle point of said muscle.

82. (New) The method of claim 79 wherein the nerve conduction studies performed according to step (f) comprise measurement of an F-wave latency.

83. (New) The method of claim 79 wherein the nerve conduction studies performed according to step (f) comprise measurement of a motor latency.

84. (New) The method of claim 79 wherein the nerve conduction studies performed according to step (f) comprise measurement of compound muscle action potential.

85. (New) The method of claim 79 wherein the processing of step (e) comprises amplitude comparison between a plurality of response signals generated at said second anatomical site.

86. (New) The method of claim 79 wherein said processing of step (e) comprises frequency spectrum comparison between a plurality of response signals generated at said second anatomical site.

87. (New) The method of claim 79 wherein the nerve conduction studies performed according to step (f) are conducted by (1) causing said stimulator to generate a stimulus on said individual at said first anatomical site, (2) causing said selected electrodes of said detector to detect response signals generated at said second anatomical site in response to said stimulus applied at said first anatomical site, and (3) evaluating said response signals detected by said selected electrodes by measuring one or more of the following parameters: F-wave latency, F-wave amplitude, distal motor latency (DML), compound action potential (CMAP) amplitude, refractory period, activity dependence, and stimulation threshold.

88. (New) The method of claim 79 wherein the determination of the electrode or electrodes located closest to the muscle point of said muscle according to step (e) is accomplished by means of an algorithm that involves evaluation of several selected parameters of the response signals detected by said plurality of electrodes.

89. (New) A method for conducting nerve conduction studies of a nerve segment or muscle in an individual, said method comprising:

(a) providing a sensor adapted for application superficially on an individual, said sensor comprising a stimulator, a detector, and a flexible connector formed integral with and serving as a mechanical and electrical connection between said stimulator and said detector, with said stimulator, detector and connector having a common substrate whereby they form an integral unit:

said stimulator being shaped to fit a first anatomical site constituting a first superficial location over a nerve of an individual and configured to generate a stimulus and apply said stimulus to stimulate said nerve;

said detector being shaped to fit a second anatomical site constituting a second superficial location over a muscle innervated by said nerve or a segment of that nerve,

said detector comprising a plurality of electrodes each configured to detect a response signal generated at said second anatomical site in response to said stimulus, said detector being made so that said electrodes have fixed positions proximate one another; and

said connector being configured to mechanically orient said stimulator and said detector relative to one another whereby to automatically position said detector substantially adjacent to said second anatomical site when said stimulator is placed substantially adjacent to said first anatomical site, whereby said electrodes are located at proximate points along said second anatomical site;

(b) placing said sensor on an individual so that said stimulator is located superficially at said first anatomical site and said detector is located superficially at said second anatomical site;

(c) operating said stimulator to stimulate said first anatomical site and monitoring said plurality of electrodes to detect response signals produced at said second anatomical site in response to the stimulation at said first anatomical site;

(d) processing the response signals detected by said electrodes, said processing involving an evaluation of two or more selected nerve conduction parameters of each of said response signals and a comparison of said response signals according to the evaluated selected parameters;

(e) selecting on the basis of said comparison of said selected nerve conduction parameters of said response signals processed in step (d) at least one electrode detecting an optimal response signal characteristic of said second anatomical site; and

(f) performing nerve conduction studies according to step (c) with said at least one electrode selected in step (e), said nerve conduction studies comprising stimulating said first anatomical site a plurality of times to evoke response signals at said second site, and then processing said evoked response signals to measure one or more of the following parameters of said evoked response signals: distal motor latency,

distal sensory latency, nerve action potential, nerve impulse velocity, amplitude, compound action potential (CMAP) amplitude, F-wave amplitude, F-wave latency, and stimulation threshold.

90. (New) The method of claim 89 wherein time domain features of the response signals are utilized in steps (d) and (e) to determine said at least one electrode.